Q-learning-based controller for fed-batch yeast fermentation

Abstract

Industrial fed-batch yeast fermentation process is a typical nonlinear dynamic process that requires good control technique and monitoring to optimize the yeast production. This chapter explores the applicability of Q-learning in determining the feed flow rate in a fed-batch yeast fermentation process to achieve multiobjectives optimization. However, to develop such control system, the complex nature of the yeast metabolism that will affect the system stability has to be considered. Q-learning is well known for its interactive properties with the process environment and is suitable for the learning of system dynamic. Therefore, the utilization and performance of Q-learning to seek for the optimal gain for the controller is studied in this chapter. Meanwhile, the performance of Q-learning under the process disturbance is also tested.